

An Airborne Particulate Monitor for Spacecraft, Phase II

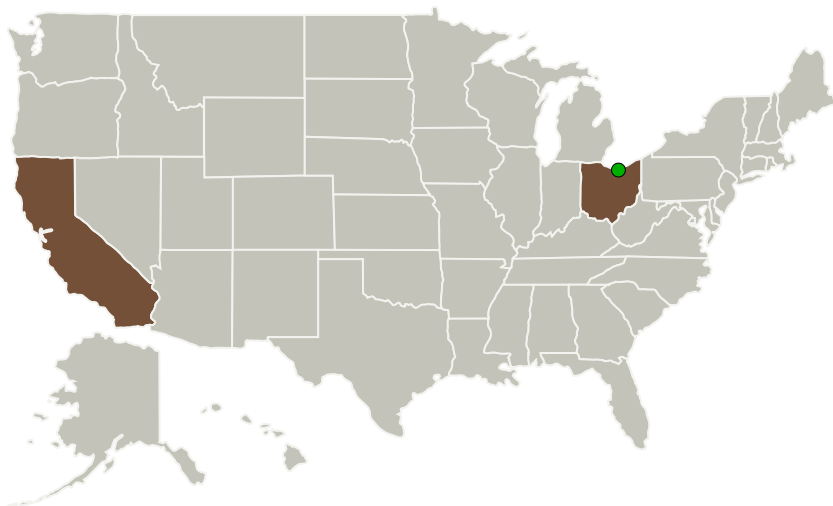
Completed Technology Project (2016 - 2020)



Project Introduction

A compact instrument will be developed to provide long-term monitoring of the number concentration and approximate size of airborne particles in microgravity environments such as found aboard spacecraft cabins. Particles as small as 10 nm will be detected by a self-sustaining, tippable, water-based condensation particle counter. This will be coupled to an optical sizing instrument to provide particle concentration and approximate sizing from 10 nm to >20 micrometers. Knowledge of the concentration and size of airborne particles on manned spacecraft is needed to assess environment to which astronauts are exposed, and to provide early warning of on-board fire. Especially important are those in the submicrometer size range. Yet to date there is no zero-gravity technique for long-term monitoring these fine particles at the low concentrations generally present. Our innovation, a tippable, self-sustaining, water-based condensation particle counter, will provide this measurement. Individual particles as small as 10nm are detected through condensational enlargement to form optically detectable droplets. Unlike other condensational methods all liquid water required for measurement is contained within, and recaptured by, the wick of the instrument. All water transport is by capillary action, and thus enabling operation at zero gravity. Combined with ultrafine particle precut, and standard optical particle counting and sizing for larger particles, this instrument system will provide particle number concentration and approximate sizing from 10 nm to above 20 micrometers.

Primary U.S. Work Locations and Key Partners



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Table of Contents

| | |
|----------------------------------------------|---|
| Project Introduction | 1 |
| Primary U.S. Work Locations and Key Partners | 1 |
| Project Transitions | 2 |
| Organizational Responsibility | 2 |
| Project Management | 2 |
| Images | 3 |
| Technology Maturity (TRL) | 3 |
| Technology Areas | 3 |
| Target Destinations | 3 |

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| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|-----------------------------------------------|----------------------|
| Aerosol Dynamics, Inc. | Lead Organization | Industry Women-Owned Small Business (WOSB) | Berkeley, California |
| ● Glenn Research Center(GRC) | Supporting Organization | NASA Center | Cleveland, Ohio |

| Primary U.S. Work Locations | |
|-----------------------------|------|
| California | Ohio |

Project Transitions

**April 2016:** Project Start**October 2020:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139861>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Aerosol Dynamics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Susanne V Hering

Co-Investigator:

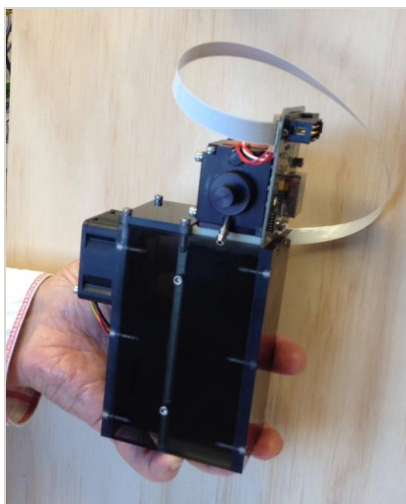
Susanne Hering

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Images



Briefing Chart Image

An Airborne Particulate Monitor for Spacecraft, Phase II
(<https://techport.nasa.gov/image/129182>)

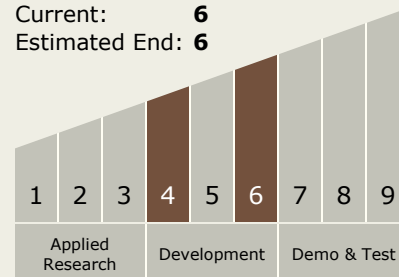


Final Summary Chart Image

An Airborne Particulate Monitor for Spacecraft, Phase II
(<https://techport.nasa.gov/image/132334>)

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - TX06.4 Environmental Monitoring, Safety, and Emergency Response
 - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System